THE IMPACT OF NUTRIENT SUPPLY ON THE YIELD OF WINTER WHEAT VARIETAS

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Abstract: *We examined the effect of nutrient supply on the yield of five winter wheat types in Mezőtúr in 2004. The soil of the experiment was calcareous meadow chernozem soil. We applied eight treatments: controll (non fertilized), controll+bacterium fertilizer, N 40+PK, N 40+PK+bacterium fertilizer, N 80+PK, N 80+PK+bacterium fertilizer, N 120+PK, N 120+PK+bacterium fertilizer. In the droughty year of 2003 the plants were able to utilise only a part of the nutrient in the soil. In the first part of 2004, due to the convenient quantity and spread of precipitation the plants took up the nutriment not only for 2004 but also the remained quantity from 2003.*

*It resulted in that according to our examination the early and midterm types reached their best yield on lower nutriment level (*Ø+B *, N 80+PK).*

2004 should be regarded as an exceptional year so we paid attention to these conditions when evaluating. Factual conclusion can be drawn only after the results of several years, we wish to continue our examinations.

Key words: winter wheat, fertilizer, bacterium fertilizer, yield,

1. INTRODUCTION

Winter wheat-growing has a significant role in the Hungarian crop production. At the end of the 1980s the average yield of winter wheat exceeded the 5 t/ha, which was appropriate on a world scale. However, since 1990 both the level of wheat growing in Hungary and the quantity of the used industrial materials in production dropped. The biggest problem proved to be the decrease in quantity and quality of nutriment supply (due to unilateral N-use) which had a negative influence on other production technological factors. We must conclude that the environment friendly and specific fertilization for the plant needs is fundamental in the development of the Hungarian wheat production.

Lelley (1971) claims that the most important agrotechnical factor for winter wheat-growing is the fertiliser.

Bocz (1963) having processed data from several countries found clear relation between the use of fertilisers and the tendency of yields.

Erdei and Szániel (1975) emphasise that fertilisers do not only increase production but also improve the quality for seeds, mill and baking industry.

As the result of purification, the number of officially recognised wheat types has significantly increased (in 2003, 126 officially recognised types) and their environmental and agrotechnical needs highly differ from one another. For this reason, not only the detailed examination of different types but the testing of different fertiliser reduction are essential. (*Jolánkai, 19*81; *Pepó Pé, 1984; Sárvári, 1987*).

2. MATHERIAL AND METHOD

2.1. Soil properties of the experimental field

The experiment was set in the experimental field of the Department of of Plant Cultivation at the Agricultural College Faculty of the Tessedik Sámuel College. The soil for the experiment was calcareous meadow chernozem with approximate neutrality (pH_{KC1} 6,72). According to the pre-soil tests the nitrogen content was acceptable (Humusz% 3,07) the phosphorus content was law but the potassium content was satisfactory (Al-soluable P_2O_5 64 mg/kg, K_2O 433 mg/kg).

2.2. Weather in the experimental years

The distribution of humidity during the growing of wheat was favourable. (Fig 1.) The great humidity in October assisted the germination, inflation and early development of plants. Except in May, there was more humidity in each month than the average which helped the stooling, shooting, blooming and graining of the wheat (Table 2). The growing season in 2003-2004 was favourable for winter wheat.

2.3. The main features of the agrotechnical applied

Our small-scaled plough experiment was set in three replications, organised as a random block in 2004. We set eight levels of nutriment supply in our experiment: control treatment (without fertilization), control+bacterial manure, N 40+PK, N 40+PK+bacterial manure, N 80+PK, N 80+PK+bacterial manure, N 120+PK, N 120+PK+ bacterial manure.

The total quantity of potassium and phosphorus and the bacterial manure (MicroSoil) were released into the soil in autumn. The N-fertilizer was released both in autumn and early spring

(30-70%). The wheat types in the experiment were the Mv Palotás, Mv Marsall, Mv Verbunkos, Buzogány, Mv Csárdás.

3. RESULTS

The yield of early maturing Mv Palotás differed from 4,86 to 5,82 t/ha on different levels of nutrient. It reached the biggest yield under the Ø+B treatment, the bigger portions of nutriment only decreased the yield in tendency. In the case of N 120+PK+B treatment the yield of wheat was significantly smaller than under the Ø+B treatment since the high fertilizer portion and the favourable year together caused yield depression. Its ability to use natural nutriments is average comparing it to the examined types. Its yield, without fertilization, is 5,71 t/ha (Figure 1).

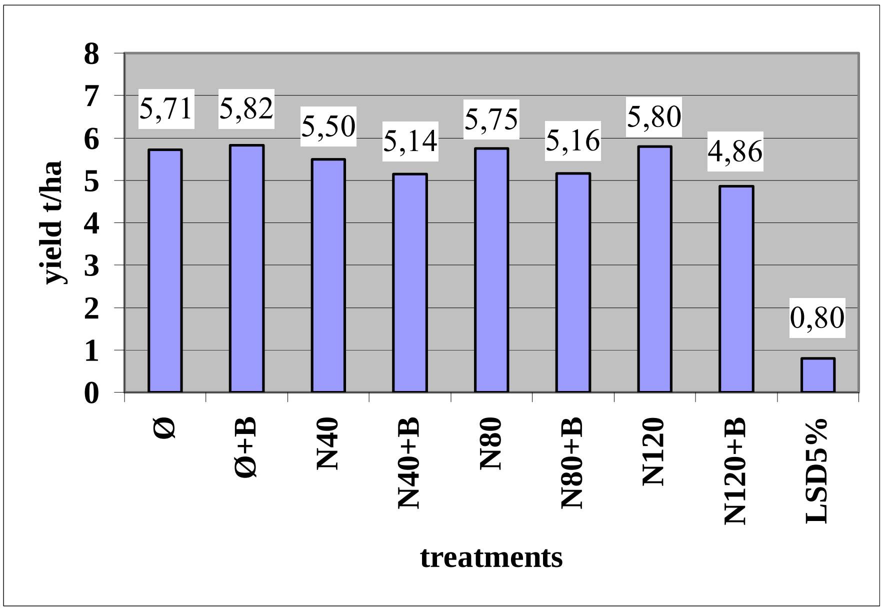

Figure 1. The yield of Mv Palotás on different nutrient levels

The yield of the other early maturing type, Mv Marshall, was the biggest it almost exceeded the 6 t/ha quantity in almost each treatment. The ability to use natural nutrients was also the best of this type as without fertilization it reached 6,81 t/ha. It produced the biggest yield, like Mv Palotás, under the Ø+B treatment (6,88 t/ha). Its smallest yield was registered under the N 120+PK+B treatment (5,93 t/ha). Treatments with bigger doses than Ø+B decreased the yield in tendency but the difference did not reach the significant level. (Figure 2).

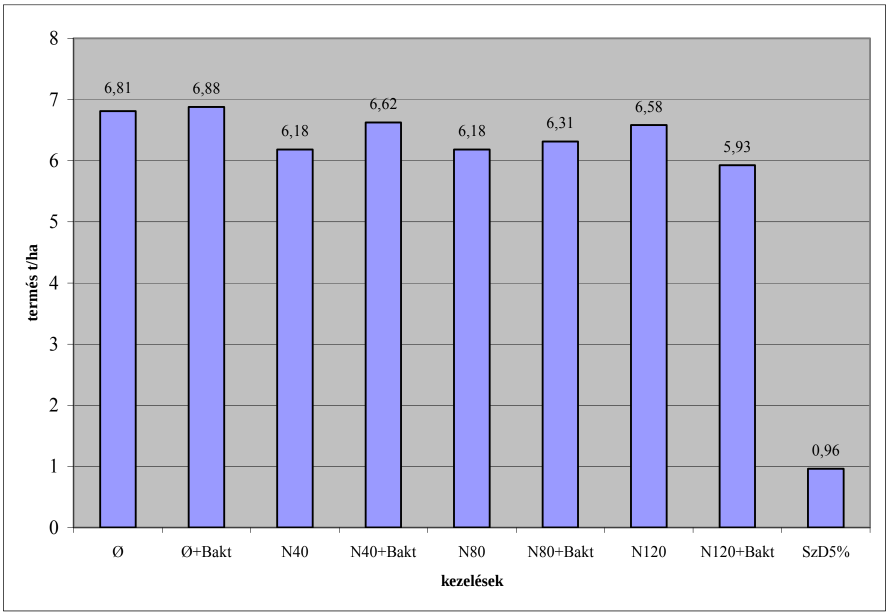

Figure 2. The yield of Mv Marsall on different nutrient levels

The maximum yield of medium maturing Mv Verbunkos was reached on N 80+PK nutrient level (5,67 t/ha), the biggest nutrient portions did not produce any further increase. Its yield under the Ø and N 80+PK+B treatments was significantly smaller than under the N 80+PK (Figure 3).

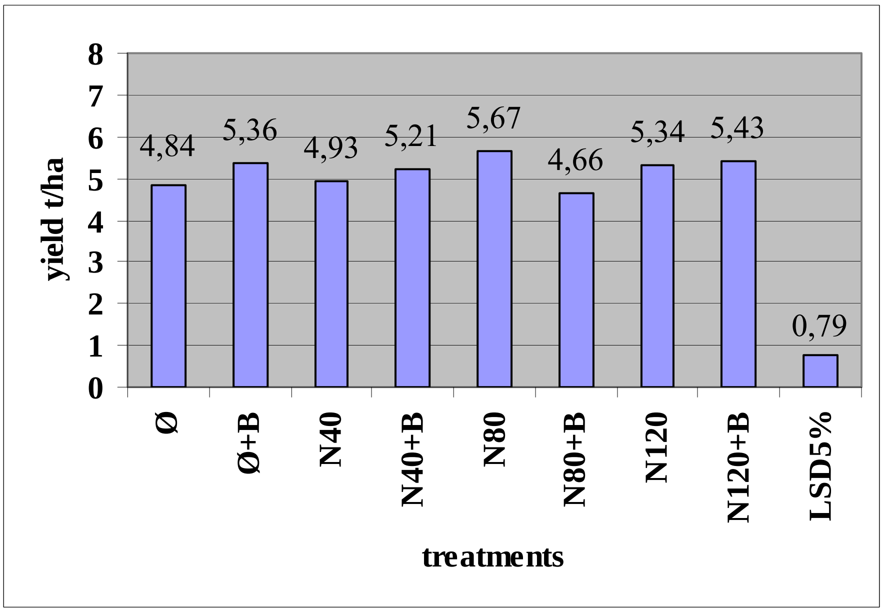

Figure 3. The yield of Mv Verbunkos on different nutrient levels

The biggest yield of medium maturing Buzogány was recognised under the Ø+B treatment (6,98 t/ha) and the smallest under the N 80+PK (5,58 t/ha). The difference here was significant. The biggest portions than 0+B only decreased the yield in tendency except in the case of N 80+PK treatment (Figure 4).

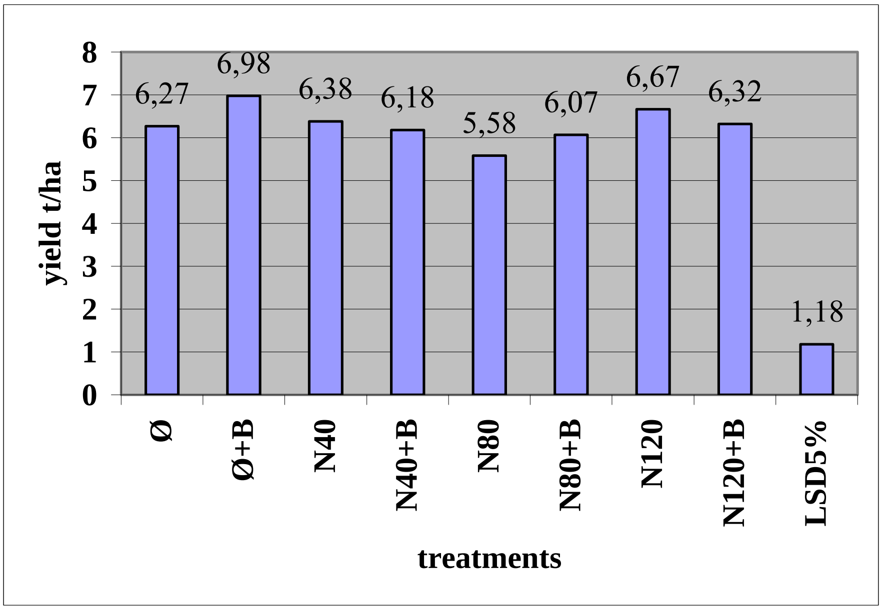

Figure 4. The yield of Buzogány on different nutrient levels

Unlike all the other types, the late maturing Mv Csárdás reached the biggest yield (6,0 t/ha) under the biggest nutrient supply (N 120+PK+B). This type is supposed to utilise the big quantity of nutrient the best due to its long growth period.

The yield under N 40+PK treatment was significantly smaller (4,87 t/ha) which was its minimum yield (Figure 5).

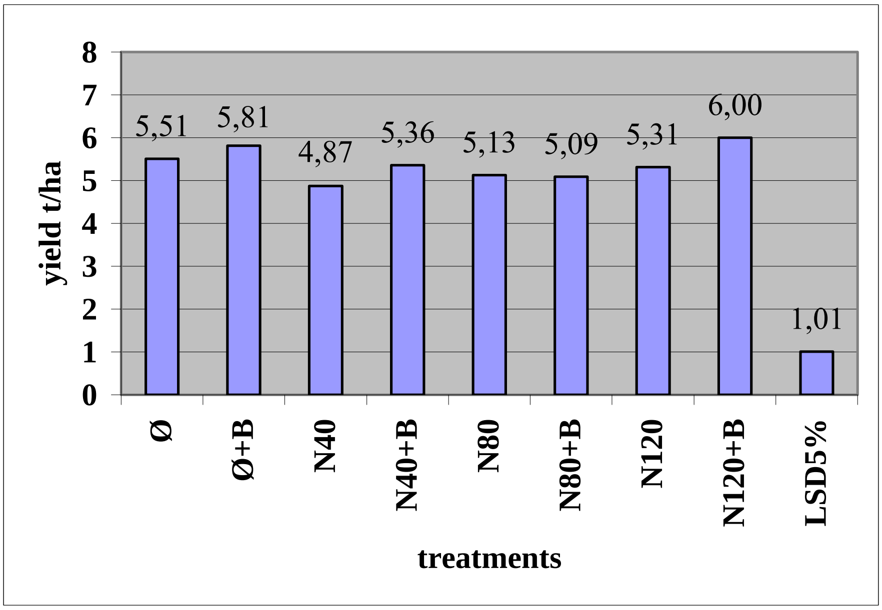

Figure 5. The yield of Mv Csárdás on different nutrient levels

4. CONCLUSION

Using soilbacterial materials, the application of chemical fertilizers can be rationally decreased which can be the base of environment friendly cultivation. However, further experiments are requisted as the effects of dry periods were impossible to study.

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